

Crystallographic texture analysis using thermal expansion measurements on polycrystalline $\text{Tb}_x\text{Dy}_{1-x}$

Correlations are reported between the crystallographic texture in polycrystalline Tb-Dy alloys and the bulk magnetostriction measured at 4 K and 77 K. The samples were plane cold-rolled to induce crystallographic alignment along the easy axis, resulting in magnetostrictive strains up to 0.6 of the single crystal values. Crystallographic texture was determined from the measured anisotropy of thermal expansion. For example, commercial grade $\text{Tb}_{.76}\text{Dy}_{.24}$ was measured to have a thermal expansion of $12.1 \times 10^{-6}/\text{K}$ along the crystallographic hard axis and $4.2 \times 10^{-6}/\text{K}$ along the rolling direction between 30 and 300 degrees Celsius. Typical single crystal values are $14.65 \times 10^{-6}/\text{K}$ and $3.27 \times 10^{-6}/\text{K}$ respectively. The orientation distribution function (ODF) coefficients, W_{200} and W_{220} , were determined using Voigt and Reuss approximations. It was found that the ODF affects more strongly the anisotropy in thermal expansion than the bulk magnetostriction.